

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS

1. (Currently Amended) A plasma processing system, said plasma processing system comprising:

a substantially cylindrical plasma processing chamber used to process a substrate, said substantially cylindrical plasma processing chamber including a top region located on the top surface of said substantially cylindrical plasma processing chamber and a peripheral region located on a surface surrounding the periphery of said substantially cylindrical plasma processing chamber, said substantially cylindrical plasma processing chamber including at least an inner wall; and

a gas flow system coupled to said plasma processing chamber, said gas flow system controlling flow of input gas into at least two different regions of said plasma processing chamber; said input gas being a source gas suitable for use to etch said substrate in said plasma processing chamber, said at least two different regions including at least one peripheral region and at least one top region of said plasma processing chamber said peripheral region of said plasma processing chamber not including any points of said top region of said plasma processing chamber, said gas flow system comprising at least one gas inlet for receiving said input gas that is to be delivered into said plasma processing chamber and at least first and second gas outlets that are each capable of delivering said input gas to said plasma processing system, at least a portion of said input gas being delivered to said plasma processing chamber via said first and second outlets, said input gas being mixed before passing through said first and second gas outlets.

2. (Original) A plasma processing system as recited in claim 1, wherein the at least two different regions include a top central region and an upper peripheral region.

3. (Original) A plasma processing system as recited in claim 1, wherein the at least two different regions include a top central region and a lower peripheral region.

4. (Original) A plasma processing system as recited in claim 1, wherein the at least two different regions include a top central region, a lower peripheral region, and an upper peripheral region.

5. (Original) A plasma processing system as recited in claim 1, wherein the at least two different regions include a lower region near the substrate.
6. (Original) A plasma processing system as recited in claim 1, wherein the plasma processing system includes a chuck and the least two different regions include a lower region near edges of the substrate, and
wherein the input gas is released through the chuck.
7. (Original) A plasma processing system as recited in claim 1, wherein said flow system controls amount or volume of the input gas into the at least two different regions of said plasma processing chamber.
8. (Original) A plasma processing system as recited in claim 1, wherein said flow system controls flow rate of the input gas into the at least two different regions of said plasma processing chamber.
9. (Original) A plasma processing system as recited in claim 1, wherein the input gas includes at least first and second gases, and
wherein said flow system independently controls relative flow rate of the at least first and second gases into the at least two different regions of said plasma processing chamber.
10. (Original) A plasma processing system as recited in claim 1,
wherein said plasma processing system further comprises a gas delivery ring that is coupled to said plasma processing chamber, and
wherein said flow system controls amount or volume of the input gas to said gas delivery ring, thereby supplying the input gas to a peripheral region of said plasma processing chamber.
11. (Original) A plasma processing system as recited in claim 10, wherein said gas delivery ring is provided on an upper portion of the plasma processing chamber, thereby the gas delivery ring supplying the input gas to an upper peripheral region of said plasma processing chamber.
12. Cancelled.

13. (Previously Amended) A plasma processing system as recited in claim 1, wherein the at least a portion of the input gas is released into a second region, the first region being a top central region within the plasma processing chamber, and the input gas that is released into the first region is delivered by the first gas outlet.

14. (Previously Amended) A plasma processing system as recited in claim 1, wherein the at least a portion of the input gas is released into a second region, the first region being an upper peripheral region that surrounds the inner wall of the plasma processing chamber, and the input gas that is released into the second region is delivered by the second gas outlet.

15. (Previously Amended) A plasma processing system as recited in claim 1, wherein the at least a portion of the input gas is released into a second region, the second region being a lower peripheral region that surrounds the inner wall of the plasma processing chamber, and the input gas that is released into the second region is delivered by the second gas outlet.

16. (Previously Amended) A plasma processing system as recited in claim 1, wherein the gas flow system receives a gas flow control signal for determining the amount or volume of the input gas that is delivered into the plasma processing chamber by each one of the first and second gas outlets.

17. (Original) A plasma processing system as recited in claim 16, wherein the gas flow control signal determines the flow rate of delivery of gas by each of the first and second gas outlets into the plasma processing chamber.

18. (Original) A plasma processing system as recited in claim 16, wherein the input gas includes at least first and second gases, and

wherein said flow control signal independently determines relative flow rate of the at least first and second gases into the at least two different regions of said plasma processing chamber.

19. (Currently Amended) A plasma processing system for processing a substrate, comprising:
a plasma processing chamber within which a plasma is both ignited and sustained for said processing, said plasma processing chamber having no separate plasma generation chamber, said plasma processing chamber having an upper end and a lower end; and

a gas flow system coupled to said plasma processing chamber, said gas flow system controlling the flow of input gas into at least two different regions of said plasma processing chamber, said at least two different regions including at least one peripheral region located at a side surface of said plasma processing chamber and at least one top region located at a top surface of said plasma processing chamber, said peripheral region being located closer to said upper end of said plasma processing chamber than said lower end of said plasma processing chamber, said at least two different regions include a top central region, a lower peripheral region, and an upper peripheral region.

20. (Cancelled)

21. (Cancelled)

22. (Cancelled)

23. (Original) A plasma processing system as recited in claim 19, wherein said flow system controls amount or volume of the input gas into the at least two different regions of said plasma processing chamber.

24. (Original) A plasma processing system as recited in claim 19, wherein said flow system controls flow rate of the input gas into the at least two different regions of said plasma processing chamber.

25. (Original) A plasma processing system as recited in claim 19, wherein the input gas includes at least first and second gases, and

wherein said flow system independently controls relative flow rate of the at least first and second gases into the at least two different regions of said plasma processing chamber.

26. (Original) A plasma processing system as recited in claim 19, wherein said plasma processing system further comprises a gas delivery ring that is coupled to said plasma processing chamber, and

wherein said flow system controls amount or volume of the input gas to said gas delivery ring, thereby supplying the input gas to a peripheral region of said plasma processing chamber.

27. (Original) A plasma processing system as recited in claim 26, wherein said gas delivery ring is provided on an upper portion of the plasma processing chamber, thereby the gas delivery ring supplying the input gas to an upper peripheral region of said plasma processing chamber.

28. (Original) A plasma processing system as recited in claim 19, wherein said plasma processing chamber includes at least an inner wall, and the gas flow system comprises:

at least one gas inlet for receiving the input gas that is to be flown into said plasma processing chamber;

at least first and second gas outlets that are each capable of delivering the input gas to the plasma processing system; and

wherein at least a portion of the input gas is delivered to the plasma processing chamber via said first and second gas outlets.

29. (Original) A plasma processing system as recited in claim 28, wherein the at least a portion of the input gas is released into a second region, the first region being a top central region within the plasma processing chamber, and the input gas that is released into the first region is delivered by the first gas outlet.

30. (Original) A plasma processing system as recited in claim 28, wherein the at least a portion of the input gas is released into a second region, the first region being an upper peripheral region that surrounds the inner wall of the plasma processing chamber, and the input gas that is released into the second region is delivered by the second gas outlet.

31. (Original) A plasma processing system as recited in claim 28, wherein the at least a portion of the input gas is released into a second region, the second region being a lower peripheral region that surrounds the inner wall of the plasma processing chamber, and the input gas that is released into the second region is delivered by the second gas outlet.

32. (Original) A plasma processing system as recited in claim 28, wherein the gas flow system receives a gas flow control signal for determining the amount or volume of the input gas that is delivered into the plasma processing chamber by each one of the first and second gas outlets.

33. (Original)A plasma processing system as recited in claim 32, wherein the gas flow control signal determines the flow rate of delivery of gas by each of the first and second gas outlets into the plasma processing chamber.

34. (Original)A plasma processing system as recited in claim 32, wherein the input gas includes at least first and second gases, and

wherein said flow control signal independently determines relative flow rate of the at least first and second gases into the at least two different regions of said plasma processing chamber.

35. (Original)A plasma processing system as recited in claim 19, wherein the at least two different regions include a lower region near the substrate.

36. (Original)A plasma processing system as recited in claim 19, wherein the plasma processing system includes a chuck and the least two different regions include a lower region near edges of the substrate, and

wherein the input gas is released through the chuck.

37. (Previously Amended) A plasma processing system for processing a substrate, comprising:

a plasma processing chamber within which a plasma is both ignited and sustained for said processing, said plasma processing chamber having no separate plasma generation chamber, said plasma processing chamber having an upper end and a lower end, said substrate being processed in said lower end;

a coupling window disposed at an upper end of said plasma processing chamber.

an RF antenna arrangement disposed above a plane defined by said substrate when said substrate is disposed within said plasma processing chamber for said processing; and

a gas flow system coupled to said plasma processing chamber, said gas flow system controlling the release of input gas, associated with forming a plasma, into a first, a second and a third region within said plasma processing chamber, said first region being a top central region located at the top surface of said plasma processing chamber, said second region being an upper peripheral region located on an upper surface of said plasma processing chamber proximate said upper end of said plasma processing chamber, said third region being a lower peripheral region located proximate said lower end of said plasma processing chamber.

38. (Cancelled)

39. (Previously Added) A plasma processing system as recited in claim 38 wherein said input gas is formed by a mixture of gases before being received by said gas inlet.

40. (Withdrawn) A plasma processing system as recited in claim 38 wherein said input gas is formed by a mixture of gases after being received by said gas inlet.

41. Cancelled

42. (Previously Added) A plasma processing system as recited in claim 19 wherein said input gas is formed by a mixture of gases.

43. (Previously Added) A plasma processing system as recited in claim 19 wherein said top surface defines said upper end of said plasma processing chamber and wherein said peripheral region is located proximate to said upper end of said plasma process chamber.

44. (Previously Added) A plasma processing system as recited in claim 19 further comprising:

a coupling window disposed at an upper end of said plasma processing chamber; and
an RF antenna arrangement disposed above a plane defined by said substrate when said substrate is disposed within said plasma processing chamber for said processing.

45. (Previously Added) A plasma processing system as recited in claim 19 further comprising:

an electromagnet arrangement disposed above said plane defined by said substrate, said electromagnet arrangement being configured so as to result in a radial variation in the static magnetic field topology within said plasma processing chamber in the region proximate said RF antenna when at least one direct current is supplied to said electromagnet arrangement, said radial variation being effective to affect processing uniformity across said substrate; and

a dc power supply coupled to said electromagnet arrangement, said dc power supply having a controller to vary a magnitude of said at least one direct current, thereby changing said radial variation in said magnetic field topology within said plasma processing chamber in said region proximate said antenna to improve said processing uniformity across said substrate.

46. (Previously Added) A plasma processing system as recited in claim 37 wherein said input gas is formed by a mixture of gases.

47. (Previously Added) A plasma processing system as recited in claim 37 further comprising:

an electromagnet arrangement disposed above said plane defined by said substrate, said electromagnet arrangement being configured so as to result in a radial variation in the static magnetic field topology within said plasma processing chamber in the region proximate said RF antenna when at least one direct current is supplied to said electromagnet arrangement, said radial variation being effective to affect processing uniformity across said substrate;

a dc power supply coupled to said electromagnet arrangement, said dc power supply having a controller to vary a magnitude of said at least one direct current, thereby changing said radial variation in said magnetic field topology within said plasma processing chamber in said region proximate said antenna to improve said processing uniformity across said substrate.

48. (Previously Added) A plasma processing system as recited in claim 37 wherein said lower peripheral region is located on a lower surface surrounding the periphery of said plasma processing chamber.

49. (Previously Added) A plasma processing system as recited in claim 37 further comprising a chuck for supporting said substrate during said processing and wherein said lower peripheral region is located on said chuck near the edges of said substrate.

50. (Currently Amended) A gas flow system for distributing gases within a plasma process chamber suitable for processing a substrate, the gas flow system comprising:

a gas source capable of supplying an input gas formed by a mixture of gases;

a plurality of outputs for releasing an output gas formed by a mixture of gases into said plasma process chamber, a first output being configured to release said output gas into an inner region of said plasma process chamber, a second output being configured to release said output gas into an outer region of said process chamber, said inner region corresponding to a center portion of said substrate and said outer region corresponding to an outer portion of said substrate; and

a gas flow controller disposed between said gas source and said plurality of outputs, said gas flow controller being configured to control the delivery of said output gas into said plasma process chamber, said gas flow controller having an inlet arranged to receive said input gas from said gas source, and a plurality of outlets arranged to deliver said output gas to different locations within said plasma process chamber, a first outlet being configured to deliver said output gas to said first output, a second outlet being configured to deliver said output gas to said second output, said gas flow controller adjusting the amount of said output gas that is delivered to said first and second outputs so as to provide better process control.

51. (Cancelled)

52. (Previously Added) A plasma processing system as recited in claim 50 wherein said input gas is mixed inside said gas flow controller.

53. (Previously Added) A plasma processing system as recited in claim 19 wherein said substrate is processed in said lower end of said plasma processing chamber.

54. (Previously Added) A plasma processing system as recited in claim 19 wherein said peripheral region is located closer to said top surface than said substrate when said substrate is disposed inside said plasma processing chamber for processing.